

# MASSACHUSETTS WATER RESOURCES COMMISSION

## Hydrologic Conditions in Massachusetts

### August 2016 Summary



- August precipitation was normal and below normal.
- August streamflows were normal and below normal.
- August groundwater levels were normal and below normal.
- August reservoir levels were normal and below normal.
- Some Massachusetts Drought Management Plan thresholds are triggered. See Appendix I for additional information and Appendix II for description of drought indices.

#### PRECIPITATION CONDITIONS

**Summary:** August precipitation was normal except for the Cape Cod & Islands and Southeast regions.

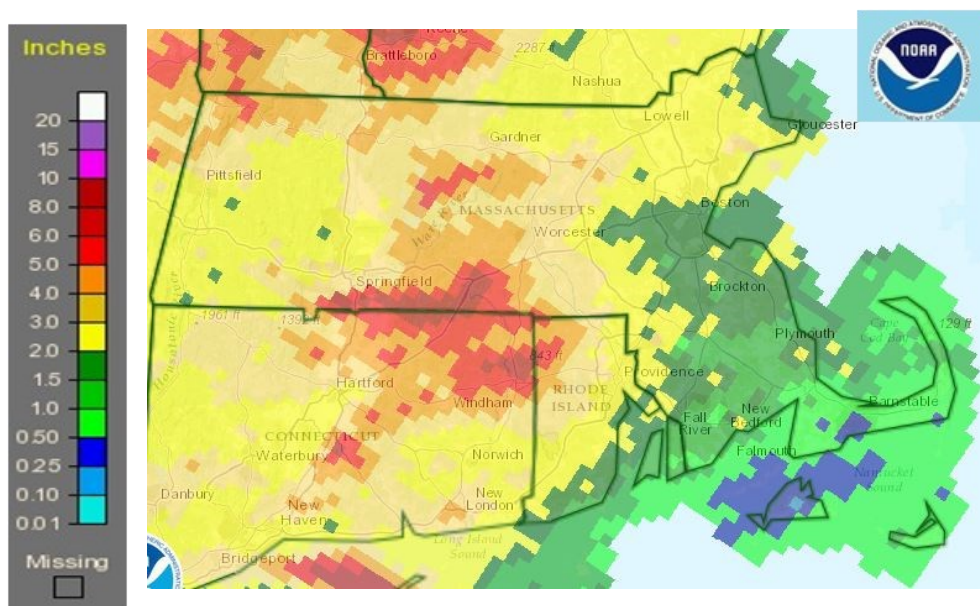
Region	August Estimated Rain-fall: Composite Sites Reporting (inches)	Departure from Normal (inches)	MA Drought Management Plan Levels	
			Standardized Precipitation Index (SPI)	Percent of Normal Index
Cape Cod & Islands	0.82	-3.18	Watch	Watch
Central	3.94	-0.12	Advisory	Normal
Connecticut River	3.74	-0.48	Watch	Watch
Northeast	2.16	-1.42	Watch	Warning
Southeast	1.85	-2.07	Watch	Watch
Western	3.89	-0.26	Normal	Normal

#### Key to Levels

Normal  
Advisory  
Watch  
Warning  
Emergency

#### Advanced Hydrologic Prediction Center August 2016 Observed Precipitation

found at <http://water.weather.gov/precip/> estimated from radar data correlated to NWS rainfall gauge reports



## STREAMFLOW CONDITIONS

**Summary:** August streamflow conditions were normal and below normal.

### General Streamflow Conditions in Massachusetts August 2016

Region	Streamflow Conditions	MA Drought Management Plan Streamflow Index
Cape Cod & Islands	ND	ND
Central	Below	Warning
Connecticut River	Below	Watch
Northeast	Below	Warning
Southeast	Below	Watch
Western	Normal	Watch

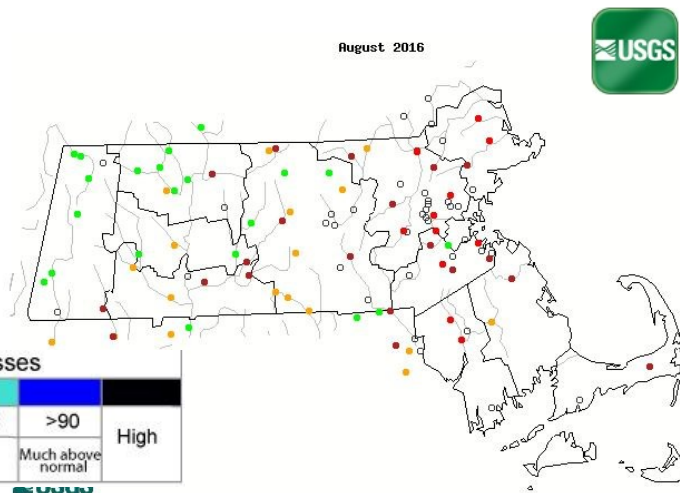
**Note:** Streamflow conditions for individual streamflow-gaging stations may differ from general conditions.  
ND: no data

### Map of Monthly Streamflow

Compared to Historical Streamflow for the Month of the Year

Average August 2016 streamflow monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program. Updated maps may be found at: <http://waterwatch.usgs.gov/index.php?r=ma&id=mv01d>

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

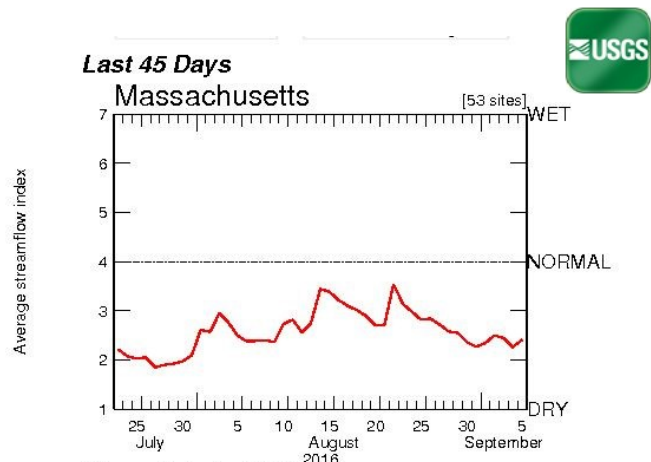


### Time Series Plot of Real-Time Streamflow Compared to Historical

This graph depicts a composite daily streamflow relative to normal streamflow for Massachusetts for the 45-day period of July 23 to Sept. 5. An updated summary plot may be found at: <http://waterwatch.usgs.gov/index.php>

#### KEY:

- 1 = New record low for day
- 2 = < 10<sup>th</sup> percentile
- 3 = 10<sup>th</sup> – 24<sup>th</sup> percentile
- 4 = 25<sup>th</sup> – 74<sup>th</sup> percentile
- 5 = 75<sup>th</sup> – 89<sup>th</sup> percentile
- 6 = > 90<sup>th</sup> percentile
- 7 = New record high for day



## GROUNDWATER LEVELS

**Summary:** August groundwater levels are normal and below normal.

### General Groundwater Conditions in Massachusetts August 2016

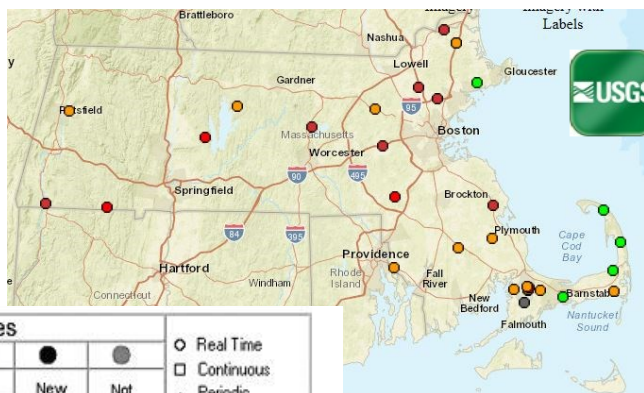
Region	Groundwater Conditions	MA Drought Management Plan Groundwater Index
Cape Cod & Islands	Normal	Normal
Central	Below	Watch
Connecticut River	Below	Watch
Northeast	Below	Watch
Southeast	Below	Watch
Western	Below	Warning

**Note:** Groundwater conditions for individual wells may differ from general conditions. ND: no data

### September 6, 2016 Real-Time Groundwater Conditions

The Real-Time USGS Groundwater Conditions can be viewed at the web site:

<http://groundwaterwatch.usgs.gov/NetMapT1L2.asp?ncd=rtn&sc=25>



## RESERVOIR LEVELS

**Summary:** August reservoir levels were normal and below normal, based on percent full values, as reported by participating water suppliers.

### General Reservoir Levels in Massachusetts at the end of August 2016

Region	Reservoir Levels	MA Drought Management Plan Reservoir Index
Cape Cod & Islands	Normal	Normal
Central	Below*	Watch
Connecticut River	Normal	Normal
Northeast	Below*	Watch
Southeast	Below	Watch
Western	Normal	Normal

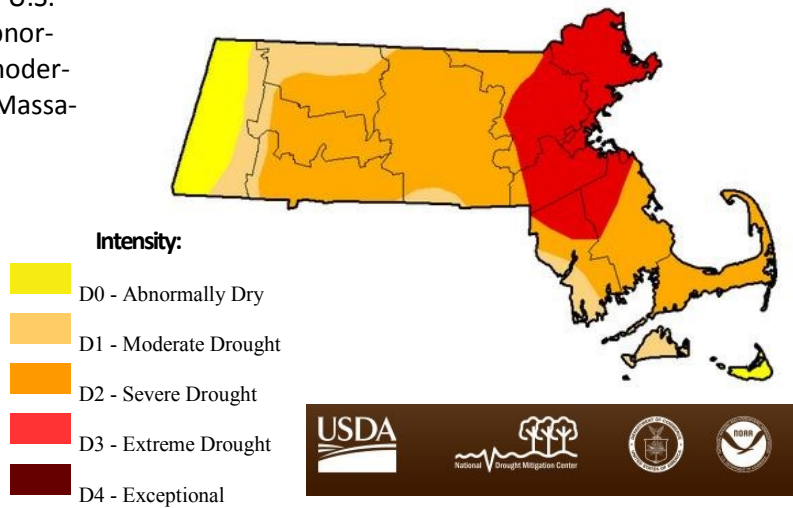
\*At least one reservoir at 2 standard deviations below.

## NWS/NOAA DROUGHT OUTLOOK AND FORECAST

### U.S. Drought Monitor: Massachusetts August 30, 2016

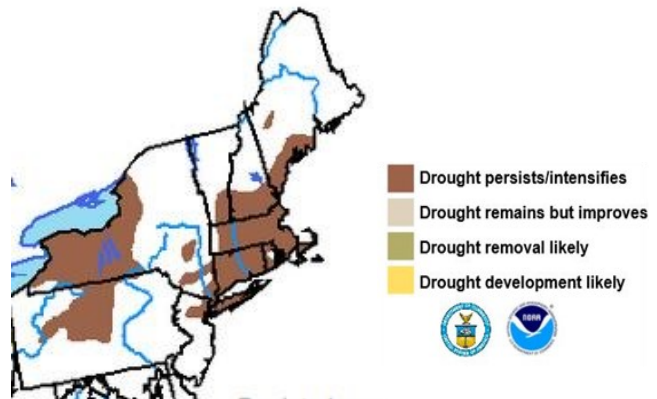
**Summary:** As of August 30, 2016, the U.S. Drought Monitor shows regions of abnormally dry conditions and regions of moderate, severe, and extreme drought in Massachusetts.

Produced by the National Drought Mitigation Center (NDMC). Intensity based on NDMC criteria. For updated map see:  
<http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?MA>



### U.S. Seasonal Drought Outlook Drought Tendency During Valid Period August 18 - November 30

The NOAA/NWS/NCEP/Climate Prediction Center U.S. Seasonal Drought Outlook valid August 18– November 30 released August 18 indicates drought persistence in Massachusetts.  
[http://www.cpc.ncep.noaa.gov/products/expert\\_assessment/sdo\\_summary.php](http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php)



## NOAA NATIONAL WEATHER SERVICE CLIMATE PREDICTION CENTER

The Climate Prediction Center 6-10 day Outlook valid Sept. 11-15 indicates above normal temperatures and no signal for precipitation anomaly for Massachusetts. (<http://www.cpc.noaa.gov/products/predictions/610day/>). The Center's three-month outlook for September, October, and November shows above normal temperatures and no signal for precipitation anomaly ([http://www.cpc.noaa.gov/products/predictions/long\\_range/seasonal.php?lead=1](http://www.cpc.noaa.gov/products/predictions/long_range/seasonal.php?lead=1)). More information is available at (<http://www.cpc.noaa.gov/index.php>).

**Key Links:** Massachusetts Drought Management: <http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/drought-status.html>

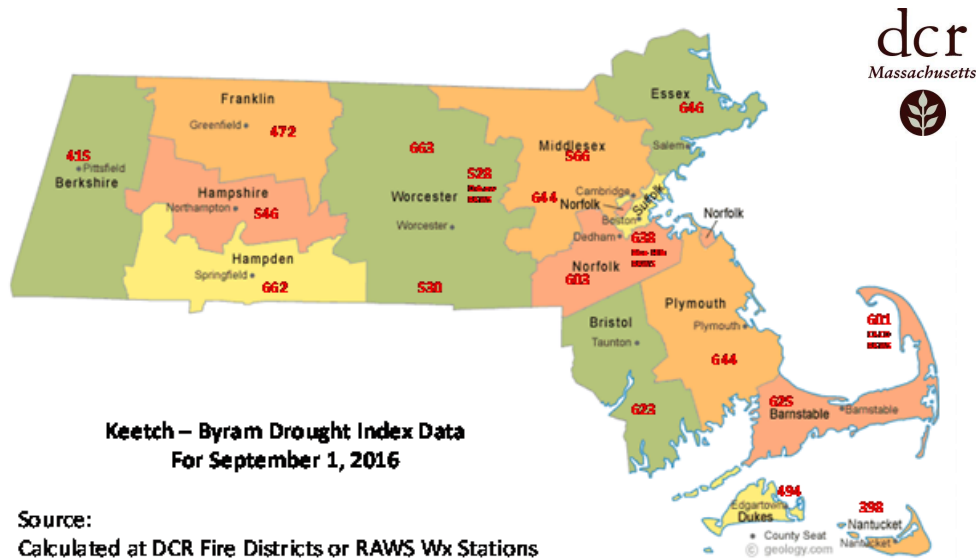
DCR Precipitation Monitoring Composite Reports and SPI

<http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/rainfall-program.html>

**September 9, 2016:** This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary in nature. Additional information, previous hydrological conditions reports, and drought management information can be found on our web site: <http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/>

## Appendix I: Additional Information

### Keetch-Byram Drought Index DCR Forest Fire Control Districts\* as of September 1, 2016



\*County colors do not correspond with drought status.

Keetch-Byram Drought Index August 2016	
Region	MA Drought Management Plan Keetch-Byram Index
Cape Cod & Islands	Warning (Cape Only)
Central	Watch
Connecticut River	Watch
Northeast	Warning**
Southeast	Warning
Western	Watch

\*\* Second month at Warning level



## Appendix II: Description of Drought Indices

(from Table 3 of Massachusetts Drought Management Plan).

Drought Level	Standardized Precipitation Index	Crop Moisture Index*	Keetch-Byram Drought Index*	Precipitation	Groundwater	Streamflow	Reservoir***
Normal	3-month > -1.5 <u>or</u> 6-month > -1.0 <u>or</u> 12-month > -1.0	0.0 to -1.0 slightly dry	< 200	1 month below normal	2 consecutive months below normal**	1 month below normal**	Reservoir levels at or near normal for the time of year
Advisory	3-month = -1.5 to -2.0 <u>or</u> 6-month = -1.0 to -1.5 <u>or</u> 12-month = -1.0 to -1.5	-1.0 to -1.9 abnormally dry	200-400	2 month cumulative below 65% of normal	3 consecutive months below normal**	At least 2 out of 3 consecutive months below normal**	Small index Reservoirs below normal
Watch	3-month < -2.0 <u>or</u> 6-month = -1.5 to -3.0 <u>or</u> 12-month = -1.5 to -2.0	-2.0 to -2.9 excessively dry	400-600	1 of the following criteria met: 3 month cum. < 65% <u>or</u> 6 month cum. < 70% <u>or</u> 12 month cum. < 70%	4-5 consecutive months below normal**	At least 4 out of 5 consecutive months below normal**	Medium index Reservoirs below normal
Warning	6-month < -3.0 <u>or</u> 12-month = -2.0 to -2.5	< -2.9 severely dry	600-800	1 of the following criteria met: 3 month cum. < 65% and 6 month cum. < 65%, <u>or</u> 6 month cum. < 65% and 12 month cum. < 65%, <u>or</u> 3 month cum. < 65% and 12 month cum. < 65%	6-7 consecutive months below normal**	At least 6 out of 7 consecutive months below normal**	Large index reservoirs below normal
Emergency	12-month < -2.5	< -2.9 severely dry	600-800	Same criteria as Warning and previous month was Warning or Emergency	>8 months below normal**	>7 months below normal**	Continuation of previous month's conditions

\* The Crop Moisture Index is subject to frequent change. The drought level for this indicator is determined based on the repeated or extended occurrence at a given level.

\*\* Below normal for groundwater and streamflow are defined as being within the lowest 25<sup>th</sup> percentile of the period of record.

\*\*\* Water suppliers should be consulted to determine if below normal reservoir conditions are due to operational issues.